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51503 7590 09/22/2009 RAYTHEON COMPANY c/o DALY, CROWLEY, MOFFORD & DURKEE, LLP 354A TURNPIKE STREET SUITE 301A CANTON, MA 02021-2714				
EXAMINER HOFFMANN, JOHN M				
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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Application Number: 09/618,741  
Filing Date: July 18, 2000  
Appellant(s): HARTNETT ET AL.

\_\_\_\_\_  
Richard Sharkansky  
For Appellant

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed 1/7/2009 appealing from the Office action mailed 8/1/2008.

The appeal brief is filed in the new format under the revised BPAI final rule before the effective date of the BPAI final rule. The Office published the BPAI final rule to amend the rules governing practice before the BPAI in *ex parte* patent appeals. See *Rules of Practice Before the Board of Patent Appeals and Interferences in Ex Parte Appeals; Final Rule*, 73 FR 32938 (June 10, 2008), 1332 Off. Gaz. Pat. Office 47 (July 1, 2008). However, the effective date for the BPAI final rule has been delayed. See *Rules of Practice Before the Board of Patent Appeals and Interferences in Ex Parte Appeals; Delay of Effective and Applicability Dates*, 73 FR 74972 (December 10, 2008). In the notice published on November 20, 2008, the Office indicated that the Office will not hold an appeal brief as non-compliant solely for following the new format even though it is filed before the effective date. See *Clarification of the Effective Date Provision in the Final Rule for Ex Parte Appeals*, 73 FR 70282 (November 20, 2008). Since the appeal brief is otherwise acceptable, the Office has accepted the appeal brief filed by appellant.

**(1) Real Party in Interest**

A statement identifying by name the real party in interest is contained in the brief.

**(4) Status of Amendments After Final**

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

The amendments filed 11/20/2008 and 10/22/2008 after final rejection filed on 8/01/2008 have been entered.

**(6) Grounds of Rejection to be Reviewed on Appeal**

The appellant's statement of the grounds of rejection to be reviewed on appeal is substantially correct. The changes are as follows: There was no separate rejection for claim 86 as indicated at the last full paragraph of page 3 of the Brief.

The rejection of claim 87 is presently being simplified so as to rely on only one of the two alternative tertiary references.

#### **(7) Claims Appendix**

The statement of the status of claims contained in the brief is correct.

#### **(8) Evidence Relied Upon**

The following is a listing of the evidence (e.g., patents, publications, Official Notice, and admitted prior art) relied upon in the rejection of claims under appeal.

4,686,070	MAGUIRE	8-1987
1,030,929	SERPEK	7-1912
5,925,584	DODDS	7-1999

PERRY et al, "Chemical Engineer's Handbook" 5th ed. 1984, McGraw Hill, pages: 4-3, 4-4, 4-20 and 4-21.

FEECO. "What is a Rotary Kiln" from [www.feeco.com](http://www.feeco.com), 11/24/2006, pages 1-4.

Applicant's Prior Art Admission (referred to as APAA) in the paragraph spanning pages 1-2 of the present specification

**(9) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

Claims 32-86, 88-93 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maguire 4686070 in view of Serpek 1030929 and optionally in view of Feeco.com's webpage on Rotary Kilns and Perry "Chemical Engineers' Handbook".

Claim 32: Maguire discloses the invention substantially as claimed. However, Maguire lacks "...mixing the aluminum oxide particles and carbon particles" (in the chamber) as well as "...passing nitrogen over the mixing aluminum oxide particles and carbon particles...." Instead of passing nitrogen over mixing particles, Maguire appears to disclose passing nitrogen over stationary (previously mixed) particles.

Maguire teaches the rest of the claim limitations as follows:

The preamble is disclosed at col 2, lines 36-39.

Step a) a chamber is provided: col. 1, line 64)

Step b) the particles are introduced into the chamber: col. 1, lines 62-64).

Step c) : the reacting of the particles with nitrogen:col 1, lines 64-67.

"passing nitrogen over" the (mixing) particles: Col. 2, lines 49-53 disclose that the mixture is in flowing nitrogen. As pointed out above, the mixture is probably not being mixed while the nitrogen passes around/over the particles.

As to the particles being at "a" temperature, see col. 2, lines 8-9. Although Maguire states that a two-step heat treatment is "preferred", it is clear that one not need two steps/temperatures.

As to the "temperature sufficient to convert the...particles and nitrogen into the aluminum oxynitride. Since Maguire's process causes the conversion of the particles into aluminum oxynitride, the temperature was clearly "sufficient".

As to removing the AlON from the chamber, it is clear that it was removed to be placed into the sintering chamber (col. 2, lines 9-12).

As to the missing disclosure of mixing during the flowing of nitrogen: Serpek discloses the process of introducing a mixture of alumina ( $\text{Al}_2\text{O}_3$ ) and carbon into a rotary reaction chamber or furnace where nitrogen is introduced for the formation of aluminum nitride - this provides for even heating and insures more intimate contact with the gas (see Serpek: Figure 1 and the paragraph spanning pages 1-2). It would have been obvious for one of ordinary skill in the art to have conducted the process of Maguire with a rotary furnace for the advantages (even heating and intimate contact) as set forth by Serpek. Thus when using the Serpek apparatus to convert the materials, the particles will be mixing while the nitrogen is flowing.

It is recognized that both the instant claims and Maguire disclose the production of an "aluminum oxynitride" while Serpek discloses preparing "aluminium nitrid" (sic). However, as evidenced by the teachings of Maguire, AlN is first formed during reaction of alumina and carbon with nitrogen at about 1550 C and subsequently at 1750 C, AlON

is formed. Thus it would have been obvious to use the temperature recommendations by Maguire for the formation of ALON if this is the desired material.

The Feeco.com reference can be applied because it discloses that rotary furnaces (not unlike Applicant's figures 5-6) have been a widely accepted and preferred means for processing of bulk solids (page 1, first paragraph of the Direct VS Indirect Rotary Kilns section.) And the subsequent paragraph of Feeco it can also reduce processing time from an hour to a few minutes - as compared to a stationary process. It is not invention to apply a 100 year old preferred processing technique to a known process.

Perry can also be applied: as per page 4-20, second column, lines 8-9 the reactor design is "a most important factor" for reaction process economy. The first two paragraphs, of page 4-3 indicate that the chemical engineer's job is to choose and design the reactor, and this includes experimental investigation. Page 4-21 gives various examples of known reactors. Thus Perry shows that once given a reaction process, it is a routine application of routine chemical engineering practices to determine/design an economical reactor. Examiner sees nothing in the record which suggests the present invention was anything but the routine application of reactor design principles. Even if such took enormous amounts of effort, time and money – it seems only obvious application of known techniques.

Claim 34: The only noteworthy differs from claim 32 is that claim 34 requires the temperature being maintained constant. It is deemed that one would infer from

Maguire's language (such as the claim 3 "said heating step occurs at a temperature" that Maguire uses only one temperature, and it is maintained there for whatever time period is necessary to complete the reaction.

Claim 36 differs in that there is a step d) of continuously removing the oxynitride. This is shown in Serpek. Continuous process and batch process (present claim 34) are generally obvious variants of each other.

Claims 33, 35, 37: there is significant overlap with Maguire's claim 3 range of 1550-1850C. It would have been obvious to perform routine experimentation to determine the optimal temperature.

Claims 38 – 84, 89-91 and 93 merely recite various permutations of the limitations discussed above, or else (like the rotation of claim 58) clearly present in the prior art.

Claims 85-86 relate to the post processing of the material – sintering to form a transparent article: Maguire disclose this at col. 4, lines 56-65

Claim 88: One would reasonably expect to get the same stoichiometry for performing the same process.

Claim 92 refers to a minimum temperature ramp rate. It would have been obvious to heat the material as fast as reasonably possible so as to make as much material as quickly as possible.



Claim 87 is rejected under 35 U.S.C. 103(a) as being unpatentable over Maguire in view of Serpek and optionally in view of Feeco.com's webpage on Rotary Kilns and Perry "Chemical Engineers' Handbook" as applied to claim 86 above, and further in view of Dodds 5925584.

Claim 87 recites hot isostatic pressing of the sintered body. It is clear from Dodds (col. 10, lines 27-44) that such is a typical and predictable process in the aluminum oxynitride body forming art, and thus would have been obvious - depending upon the densification degree desired for the body. In particular note the shielding use (Dodds col. 1, lines 20-40) which reasonably implies the desirability of complete densification.

Claims 32—86 and 88-93 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Prior Art Admission (hereinafter 'APAA') in the BACKGROUND section of pages 1-2 of the instant specification, alone or in view of Serpek 1030929 and optionally in view of Feeco.com's webpage on Rotary Kilns and Perry "Chemical Engineers' Handbook".

This rejection has substantially the same basis as the above rejections, except that the APAA provides the same evidence as Maguire: that the it is known to combine alumina, carbon and nitrogen together in a batch process to form the claimed material. But the APAA does not disclose mixing during the heating. It would have been obvious to mix the materials during heating - in particular in light of the secondary references for the reasons given above.

### **(10) Response to Argument**

It is argued that the prior art references do not recognize that one can produce ALON in a single conversion step process. This is not very relevant because the present claims do not require a single conversion step process. Nor is there any disclosure in the present application of a single conversion step process. The claims and specification only disclose combining starting ingredients, reacting them (with heating and mixing) and thereby creating ALON. The claims and specification are silent as to the reaction/conversion using only a single conversion step. Nor has any evidence or rationale been presented which suggests the that one would expect a single step. Moreover as indicated in Perry, page 4-3, 2nd column, under the "Complex Reactions" subheading: *Most reactions important in industrial processes are quite complex in nature because their reaction mechanisms are considerably different from the stoichiometric equations.* Thus, since one of ordinary skill understands that chemical processes are complex and have (plural) reaction mechanisms, one of ordinary skill would likely assume the creation of AION would involve something other a simple straight stoichiometric. See, also the bottom of page 4-4 of Perry which compares describes the over-all stoichiometric reaction (5) as actually being the result of four other reactions (1-4). Thus, the present application's silence as to the actual chemistry of applicant's chamber, one of ordinary skill would not in any way infer there it is only a single step conversion. Rather one would expect plural steps/reactions.

Appellant then argues about the clear teaching of two reactions at two different temperatures. Examiner agrees that such is a teaching, but this is not very relevant because the rejection is based on other clear teachings - most notably that one can combine the materials and heat to a single temperature (for example at claim 1 of Maguire).

It is also argued that the use of a rotating drum for economy comes from Applicant's teaching, not the two-step process of the prior art. This is a false choice because the basis for the rejection is that the economy of a rotating drum comes from an ordinary chemical engineer doing his ordinary task of finding the most economic reactor. This has not been disputed by appellant.

As to the argument that the prior art would lead one to "remove the formed aluminum nitride to react the formed aluminum nitride with alumina at a different temperature to form AlON". There is no rationale or basis for removing in the applied references. Nor does appellant offer any rationale as to why one would remove the AlN.

Examiner notes it is likely inherent that appellant's own invention encompasses a two-step process. For example, present figure 6, one would understand that materials are added to the drum substantially at room temperature, and is heated progressively, including passing through the temperature of 1550-1620 C. And since Maguire (col. 2, lines 54-60) indicates partial conversion to AlN when mixing carbon, alumina and nitrogen at 1550-1620 C (Maguire claim 4), it is reasonable to expect that Appellant

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also forms some amount of AIN as the materials are heated from room temperature to 1825 C (spec. page 6, line 7).

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/John Hoffmann/

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/Yogendra N Gupta/

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/Anthony McFarlane/